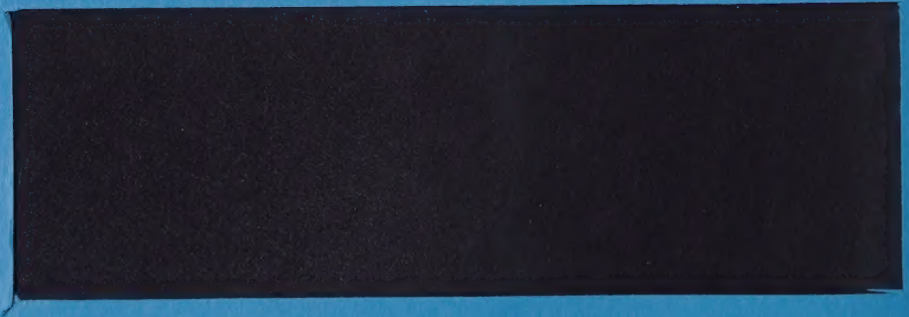
HICKOK

MODEL 5057A

DUAL POWER SUPPLY

INSTRUCTION MANUAL

HICKOK ELECTRICAL INSTRUMENT COMPANY
10514 Dupont Avenue • Cleveland, Ohio 44108 • Phone 216-541-8060



REFERENCE

MODEL 5057A

DUAL POWER SUPPLY

INSTRUCTION MANUAL

(Stock No. 2490-674)

HICKOK TEACHING SYSTEMS INC.

HICKOK TEACHING SYSTEMS INC.
Wheeling Avenue, Woburn, Massachusetts 01801

HICKOK

WARRANTY

The Hickok Electrical Instrument Company warrants this instrument of its manufacture to be free from defects in material and workmanship for one year (12 months) from the date of original purchase. Any instrument found to be defective during this period may be returned, transportation prepaid, to the factory for repair, or at our option, replaced without charge.

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons, or which have been subject to misuse, negligence, or accident, or which have had the serial number altered, effaced or removed. Neither shall the warranty apply where a warranty registration card has not been properly completed and returned to us promptly after purchase. This warranty is in lieu of all other warranties whether expressed or implied.

RETURNING EQUIPMENT FOR REPAIR

Before returning any equipment for service, the factory must first be contacted, giving the nature of the trouble. Instructions will then be given for either correcting the trouble or returning the equipment. Upon authorization, this equipment should be forwarded directly either to the Hickok factory address at 10514 Dupont Avenue, Cleveland, Ohio, 44108, or to a designated service station in your locality.

19120-158

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SECTION I
GENERAL

The 5057 Power Supply is a rugged, versatile instrument ideally suited for lab or classroom use. It consists of two independent 0 to 25 volt, 0 to 2 amp constant voltage/current limited supplies which can be operated in a variety of modes.

A front panel switch allows the unit to be used in four modes: (1) a 0 to 50 volt, 0 to 2 amp supply, or (2) a 0 to 25 volt, 0 to 4 amp supply, or (3) two independent 0 to 25 volt, 0 to 2 amp supplies, or (4) a 0 to 2 amp, 0 to ±25 volt dual tracking supply. (That is, one supply automatically adjusts its voltage to be the negative equal of the first supply.)

Both voltage and current settings are continuously adjustable, and panel meters monitor the outputs. A LED indicator lights up when the supply is current limiting. A pushbutton switch facilitates current adjustment by internally shorting the supply output terminals — no need to disconnect the load.

The supplies have overvoltage crowbars for additional protection. The outputs may be safely interconnected in any manner without regard to any control settings.

SECTION II
SPECIFICATIONS

INPUT

Voltage Requirements:	105 to 125V AC at 50/60Hz for Model 5057 or 210 to 250V AC at 50/60Hz for Model 5057E
Power:	250 watts max

LOW VOLTAGE AC OUT

Output Voltage:	12.6 volts AC ±5% center-tapped
Load Regulation:	15%
Maximum Load:	3 amps continuous
Output Protection:	2 circuit breakers, one in each leg of the output

LOW VOLTAGE DC SUPPLIES - A AND B SECTIONS

Voltage Output:	0 to 25 volts DC, regulated, continuously variable
Current Output:	0 to 2 amps DC, adjustable current limit

Load Regulation:	≤ 0.1% +5 mV for full-load to no-load change in current
Line Regulation:	≤ 0.1% from nominal line to high line or low line
Noise and Ripple:	≤ 10 mV rms
Transient Recovery Time:	≤ 15 ms to within 10 mV following a full-load change in output
Internal Protection:	In addition to the internal current limit protection, the output terminals are protected with an overvoltage crowbar with a 36 volt triggering threshold.

METERING

Meter "A":	0 to 50 volts DC, 0 to 25 volts DC or 0 to 2 amps DC, depending on the power supply mode (see OPERATING INSTRUCTIONS) and the position of the METER function switch for the "A" supply. The current scale may be expanded to 0 to 200 mA, when measuring current, by means of a front panel switch. (See OPERATING INSTRUCTIONS.)
Meter "B":	0 to 2 amps DC, 0 to 4 amps DC, or 0 to 25 volts DC, depending on the power supply mode (see OPERATING INSTRUCTIONS) and the position of the METER function switch for the "B" supply. The current scale sensitivity may be expanded, when measuring current, by means of a front panel switch. (See OPERATING INSTRUCTIONS.)
Metering Accuracy:	DC volts ±2% of reading ±2% of full scale DC amps (x1.0 scale) ±2.2% of reading ±2% of full scale DC amps (x0.1 scale) ±3% of reading ±2% of full scale

GENERAL

Dimensions:	Height — 7-1/2" (19 cm) Width — 16-7/8" (43 cm) Depth (including handles) — 10-3/8" (26.4 cm)
Weight:	26 pounds (11.8 kg)
Fusing:	Powerline of all supplies fused independently. Fuseholders are accessible on the rear panel.
Protection:	The sections of the power supply may be safely interconnected in any manner without damage, regardless of any mode of operation, polarity, or setting of the current and voltage controls.

SECTION III
OPERATING INSTRUCTIONS

3-1. INITIAL INSPECTION AND OPERATIONAL CHECK

This unit was thoroughly inspected for mechanical and electrical defects before shipment. Upon receipt, inspect for mechanical damage which may have occurred during shipment. The shipping carton should be saved should it become necessary to trans-ship the unit.

The instrument is shipped ready for bench operation and it is necessary only to connect it to a suitable source of power to be ready for operation. The power line requirements are listed under SPECIFICATIONS.

3-2. A AND B SUPPLY

OVERLOAD LIGHT:

A LED indicator that lights up when the supply is current limiting, i.e., when the load demands more current from the supply than the amount which is preset by the CURRENT controls. The overload light will also glow if the internal overvoltage crowbar has been triggered.

PRESS-TO-SET CURRENT

A pushbutton switch which internally shorts the output jacks. This is to facilitate setting the maximum desired output current without having to disconnect any external load. Pushing this switch also resets the overvoltage crowbar if it has been tripped.

CURRENT SCALE: (ALL MODES)

The switch increases the current sensitivity of the meter so that small currents can be measured accurately. For example, if the meter is reading 0 to 2 amps with the switch in the X1 position, it will then read 0 to 200 mA when the switch is in the X.1 position.

MODE:

The 5057 is capable of four distinct modes of operation. Selection of a particular mode is done using the MODE switch.

MODE 1 A supply only, B supply jacks disconnected

Voltage out:

0 to 50 volts, continuously variable using the A supply voltage adjust controls. The B supply voltage controls are inoperative.

Voltage Meter:

The output voltage is automatically monitored with the A meter regardless of the position of the A supply METER function switch. The voltage scale is automatically set to 50 volts.

Current out:

The output current limit may be set between 10 mA and 2 amps by using the A supply CURRENT controls. The B supply CURRENT controls are inoperative. To facilitate setting the maximum output current, depress the A supply PRESS-TO-SET CURRENT switch and monitor the output current. Use the coarse/fine controls to adjust to the desired limit, then release the pushbutton.

Current Meter:

The output current is automatically monitored with the B meter regardless of the position of the B supply METER function switch. The current scale is automatically set to 2 amps.

MODE 2 A supply only, B supply jacks disconnected

Voltage out:

0 to 25 volts, continuously variable using the A supply volts controls. The B supply volts controls are inoperative.

Voltage Meter:

The output voltage is automatically monitored with the A meter regardless of the position of the A supply METER switch. The voltage scale is automatically set to 25 volts.

Current out:

The output current limit may be set anywhere between 20 mA and 4 amps by using the A supply CURRENT control. The B supply CURRENT controls are inoperative. To set the current limit use the A supply PRESS-TO-SET CURRENT switch.

Current Meter:

The output current is automatically monitored with the B meter regardless of the position of the B supply METER switch. The current scale is automatically set to 4 amps.

MODE 3 A and B supplies operate independently.

General:

In this mode the A and B supplies are completely independent of each other. The A VOLTS and CURRENT controls affect the A supply only, and the B VOLTS and CURRENT controls affect the B supply only. Similarly, the A meter monitors only the activity at the A supply output jacks, while the B meter monitors the B supply output.

Since the supplies are independent, they can individually power two different circuits, or if interconnected externally, they can provide two different voltages to the same circuit. For example, if the "-" A output jack is jumpered to the "+" B output jack, a circuit can receive two unequal plus and minus voltages, such as +12 and -6 volts. Each supply remains independent including the current limit capability even when series connected.

Voltage out:

Each section is capable of 0 to 25 volts, continuously variable with their respective coarse and fine voltage adjust controls.

Current out:

Each section can be set to limit between 10 mA and 2 amps by using the respective CURRENT coarse and fine controls and PRESS-TO-SET CURRENT switches.

Metering:

Each section has its own independent meter. The appropriate METER switch selects either voltage or current monitoring for that supply. The meter scales are automatically set to 25 volts when measuring voltage and 2 amps when measuring current.

MODE 4 A and B supplies are dual-tracking

General:

In this mode, the B supply is "slaved" to the A supply so that the output voltage at the B terminals will be the negative equal of the A output voltage. The "-" A jack is internally connected to the "+" B jack, thus allowing either of these terminals to be used as a power supply common.

Voltage out:

0 to ±25 volts, available simultaneously. The positive voltage is available at the "+" A jack and the negative potential is obtained from the "-" B jack. Both voltages are simultaneously adjusted with the A supply volts control. For example, if this control is set to obtain +12 volts from the "+" A jack, then "-" 12 volts will automatically appear at the "-" B jack. The B supply volts controls are inoperative.

Current out:

The CURRENT limit settings for each supply section are independent. Either side may be adjusted to limit between 10 mA and 2 amps by using the appropriate CURRENT controls and PRESS-TO-SET CURRENT switches.

Metering:

Each section has its own independent meter. The appropriate METER switch selects either voltage or current monitoring for that section. The meter scales are automatically set to 25 volts when measuring voltage and 2 amps when measuring current.

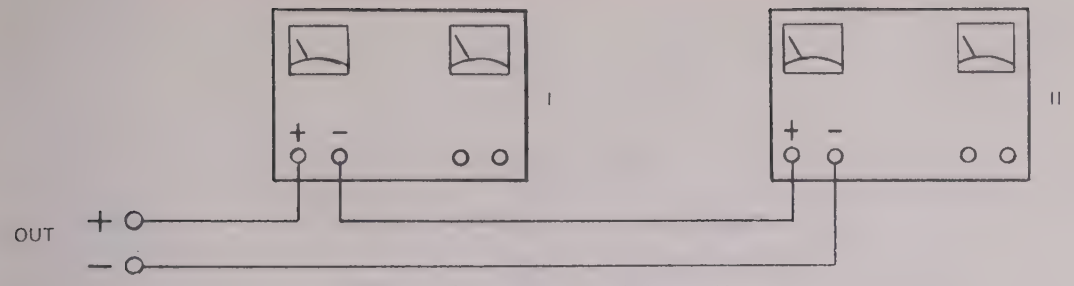


Figure 1. Series Unit Operation

3-3. OPERATION AS A CURRENT SOURCE

It is possible to use the 5057 as a single or dual current source, in any of its 4 modes. This is possible because the supply provides a constant output current whenever it is in current limit.

To use it as a current source, first turn the voltage adjust controls to their maximum clockwise position. Next with the PRESS-TO-SET CURRENT button and the CURRENT control, select the desired output current. The only restriction, of course, is to be sure that the load does not require more voltage than the supply can deliver.

3-4. MULTIPLE UNIT OPERATION

If higher voltages than those available from a single Model 5057 are desired, two units may be connected in series as shown in Figure 1. If both units are in Mode 1, then the effective output can be 0 to 100 volts at 0 to 2 amps. If both units are in Mode 2, then the effective output can be 0 to 50 volts at 0 to 4 amps. The output voltage will be the sum of the output voltages from I and II. The maximum output current will be determined by whichever unit has the lowest current limit setting.

The maximum allowable voltage between the minus output terminal and the 5057 and ground is 350 volts DC.

If greater currents than those available from a single 5057 alone are desired, it is possible to connect two units in parallel as shown in Figure 2. If both units are in Mode 1, the effective output is then 0 to 50 volts at 0 to 4 amps. Note that this output can be obtained by connecting the supplies in series as described previously. If both units are in Mode 2, then the parallel hook-up would give 0 to 25 volts at 0 to 8 amps.

Unlike series operation, both units must be set to the same output voltage when parallel connected. The total output current will be the sum of output currents from each unit.

Since both units cannot be set to exactly the same voltage, one will go into current limit and drop its output voltage down until it equals the voltage setting of the second unit, whereupon the latter will turn on and provide the balance of the current demanded by the load.

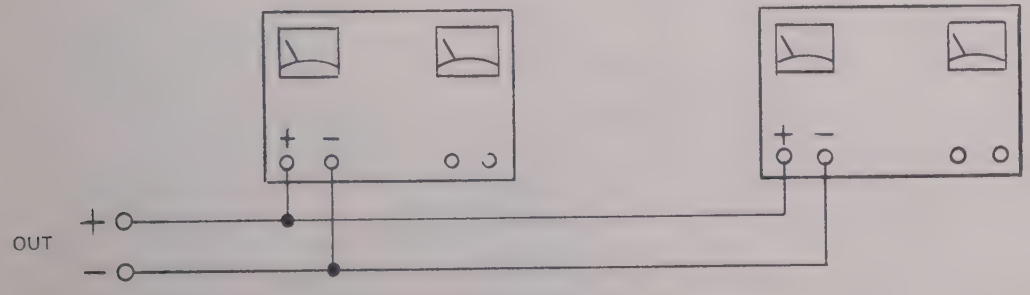


Figure 2. Parallel Unit Operation

SECTION IV
THEORY OF OPERATION

4-1. THE BASIC REGULATOR

The heart of the 5057 is a series-pass voltage regulator. Refer to Figure 3.

A filtered, but unregulated, DC voltage (Vin) is applied to the input of the series-pass element. A reference voltage, whose magnitude is equal to the desired output voltage, is applied to amplifier AR103. If the output voltage (Vo) is not equal to the reference voltage, the amplifier will provide an error signal to the series-pass element of such magnitude and polarity as to cause Vo to be equal to the reference voltage. The action of AR103 will keep Vo constant even under varying input and output loading conditions.

The current limit feature is added by using a second amplifier, AR102, as shown in Figure 4. The output current (Io) is sensed by monitoring the voltage drop across R123. A reference voltage (Vc) is established at AR102 as shown in Figure 4. When the output current (Io) is large enough to cause a voltage drop across R123 to be equal to Vc, AR102 will "kick in" and adjust the drive to the series-pass element to limit the output current to $Io = \frac{Vc}{R123}$. If Io should drop below this value, then AR102 becomes ineffective and the output voltage is regulated by AR103 as before.

4-2. PRE-REGULATOR

To minimize power dissipation, the 5057 incorporates a switching SCR pre-regulator in front of the series-pass element. A simplified version of the pre-regulator is shown in Figure 5.

The function of the pre-regulator is to connect the main filter capacitor C104 to the rectified input voltage (Vin) only when the capacitor voltage (Vc) begins to drop below the level required to maintain the output voltage (Vo).

To illustrate, temporarily ignore CR104. Now suppose Vo is 6 volts, and also that 5 volts must be maintained across the series-pass element for proper operation. This means Vc must not be allowed to drop below 11 volts.

CR111 is a 5 volt zener. If Vc is 12 volts, then V_A will be 12 - 5 = 7 volts. Since Vo is 6 volts, the output of the comparator AR101 will be low and Q102 will be off. When Vc drops to less than 11 volts, however, V_A will be slightly less than 6 volts, causing AR101 to go high, turning on Q102.

The action of CR104 is to prevent AR101 from going high until Vin is about the same level as Vc. This keeps large surge currents from passing through Q102 when it turns on.

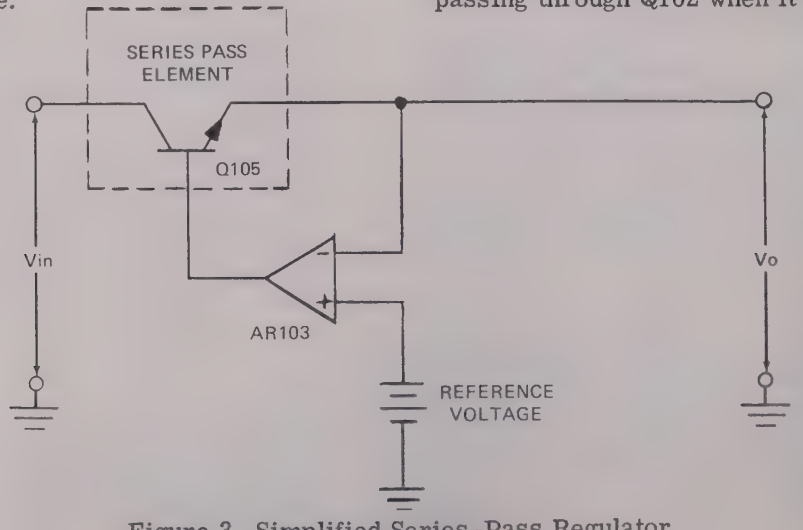


Figure 3. Simplified Series-Pass Regulator

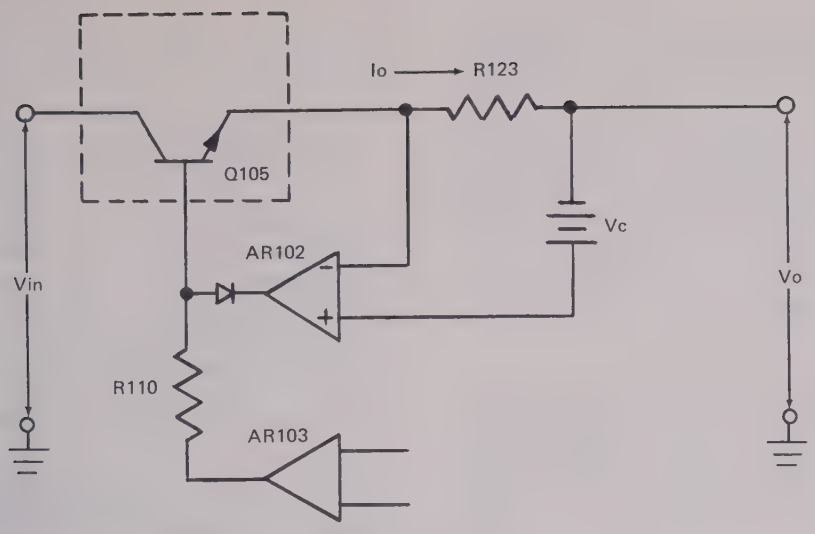


Figure 4. Simplified Current Limiting

4-3. REFERENCE

Refer now to the schematic. The main supply voltage is developed across CR102 in conjunction with T101. The positive output of the bridge eventually goes to the series-pass element, while the negative voltage coming from the bridge is filtered by C105 and used to establish a below ground reference. This negative voltage is used to enable the regulator output to reach zero.

The SCR pre-regulator consists of Q101, Q102, AR101 and their associated components. The function of Q101 is to increase the drive capability of AR101 so that it can trigger Q102. Surge currents through Q102 are limited by R102. The main filter capacitor is C104.

The series-pass element consists of Q105 and its driver, Q104. The voltage error amplifier is AR103, which compares the output voltage brought via a "sense" line, to the established reference voltage.

The reference voltage for AR103 is obtained by using R106 and R107 (the front panel voltage adjust controls) to divide down the voltage across CR108, the reference voltage zener. The voltage at CR108 is very stable since it is fed from a constant current source consisting of Q103 and its associated components. CR105 establishes a constant voltage across R105. This forces the emitter current and hence the collector current of Q103 to remain constant.

The bottom of the R106, R107 voltage divider is referenced to a slightly negative potential set up by CR109 and R108. This insures that the output of AR103 will go low, turning off Q105, when R106 and R107 are turned all the way down. The addition of R113 removes any leakage current which may come through Q105 when it is biased off.

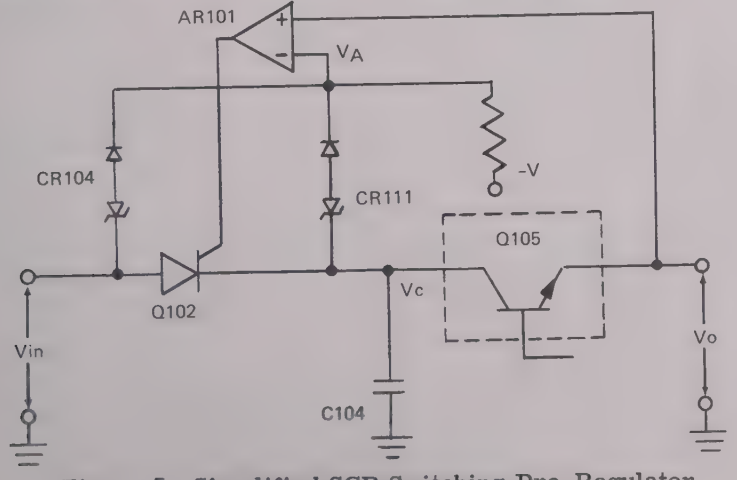


Figure 5. Simplified SCR Switching Pre-Regulator

The current limit amplifier is AR102. It compares the voltage developed across the current sensing resistor, R123, to a current limit reference voltage.

This voltage is established across CR116. It is divided down by R118 and R119 (the front panel CURRENT controls) and further scaled down by R124 through R126. The two internal trim pots, R120 and R125, are respectively adjusted to set the minimum and maximum output currents obtainable.

During current limit, the output of AR102 is low. This removes part of base drive to Q104 to limit the output. Also, CR107 becomes forward biased. This diode is light emitting and serves as the front panel overload indicator.

4-4. OUTPUT CROWBAR

The output over-voltage crowbar circuit consists of Q106 and its associated components. If the output voltage exceeds 36 volts, CR117 zeners and triggers Q106 which shorts the output. CR118 protects the regulator against externally applied negative voltages.

4-5. SUPPORT CIRCUITS

The power supply for the operational amplifiers, AR101 through AR103, is derived from CR101 and its associated components. To prevent unwanted transients from appearing at the power supply output when the power is turned off, C102 is larger than C101 so that the positive voltage going to the op amp collapses faster than the negative voltage.

4-6. OPERATION IN THE VARIOUS MODES

Refer to the switching schematic. The meter switching, although it may look complex, is really straightforward and is just a matter of connecting each meter in the right place with the proper scaling resistor. When voltage is being monitored, the meter is connected across the regulator output jacks. When current is being measured, the meter is connected across the current limit sense resistor (R123).

More complicated is the way in which the two regulators get interconnected in various modes. Simplified explanations follow.

MODE 1 "A" 0 to 50 Volts, 0 to 2 Amps

Refer to Figure 6. In the first mode, the two supplies are connected in series to obtain a 50 volt maximum output. The A supply voltage reference is obtained as usual, but the B supply is "slaved" to the A supply by having the B voltage reference obtained from R1 and R2. If the two resistors are equal, the B supply will adjust itself to be the same magnitude as the A supply. Thus, Vout can be twice the voltage obtainable from one supply alone.

The current limit for the B supply is internally set to the maximum level in this mode. Thus, the output current is solely determined by the external current control for the A supply.

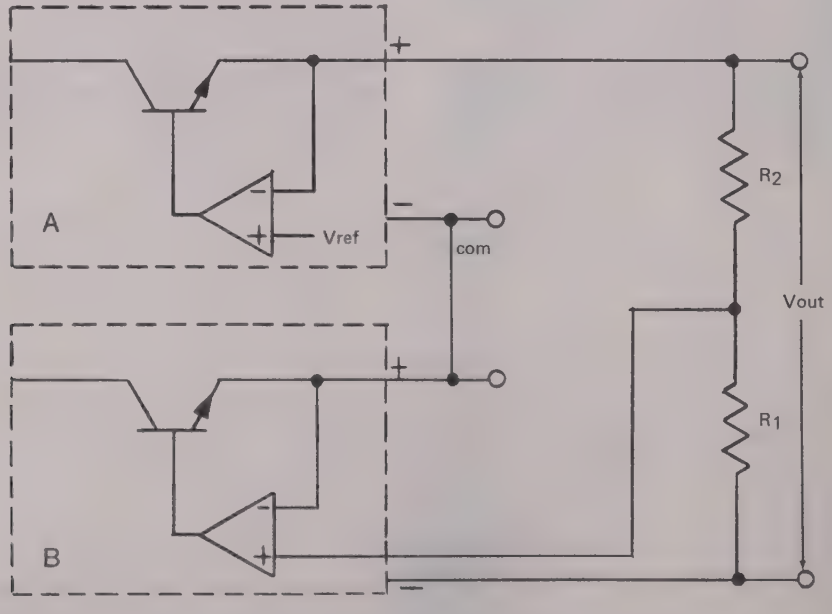


Figure 6. Series Operation

MODE 2 "A" 0 to 25 Volts, 0 to 4 Amps

Refer to Figure 7. In the second mode, the two supplies are connected in parallel to obtain twice the current normally available from one supply alone. This is accomplished as follows:

The B supply is "slaved" to the A supply in such a way that the B supply is forced into providing an output current which is identical to the current output from the A supply. The B voltage error amplifier compares the voltages developed across the current sensing resistors Rc. Equilibrium is reached when the B current equals the A current.

The current limit amplifier for the B supply is disabled in this mode, since the B current depends upon the A current setting. The output voltage is set by the A supply.

MODE 3 "A" and "B" Independent 0 to 25 Volts, 0 to 2 Amps

In the third mode, the two supplies are completely independent of each other. There is no interaction between the voltage and current controls for either supply. The regulators and their associated current limit circuits operate as described in the beginning of this section.

MODE 4 "A" and "B" Dual Tracking 0 to ±25 Volts, 0 to ±2 Amps

In the fourth mode, the supplies are connected in series as in the first mode except the terminals marked "com" in Figure 6 are available at the output. If these are used as a reference, plus and minus voltage are simultaneously available at the output.

The A voltage control still varies both supplies together, but each supply retains individual current limit capability.

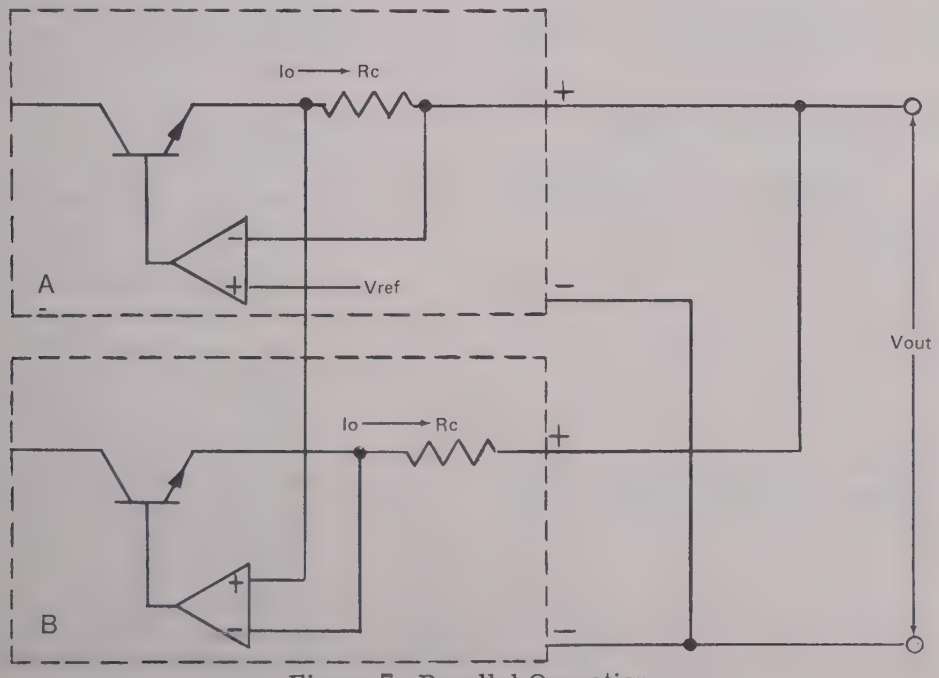


Figure 7. Parallel Operation

SECTION V
CALIBRATION

5-1. CALIBRATION PROCEDURE

NOTE

1) The following adjustments may be performed at any time in any order.
2) Minimum current limit must be at least 10 mA to satisfy internal bleeder resistor requirements.
3) Maximum current limit must not exceed 2 amps to stay within component operating limits.

1. Minimum current limit for A supply

   a. Turn the MODE select to position 3 (A and B supplies independent).

   b. Place the METER switch in V position.

   c. Adjust the voltage output to at least 5 volts.

   d. Place the METER switch in I position.

   e. Set the CURRENT scale switch to X.1 (0 to 200 mA full scale).

   f. Turn both the coarse and fine CURRENT controls fully counterclockwise.

   g. Short the output jacks by depressing the PRESS-TO-SET-CURRENT switch, or by using an external jumper.

   h. Monitor the current meter and adjust R120 until a reading of 10 mA is obtained.

2. Minimum current limit for B supply

   a. Follow the same procedure used for the A supply as described above, except use the B supply controls and adjust R220.

3. Maximum current limit for A supply

   a. Turn the MODE select to position 3 (A and B supplies independent).

   b. Place the METER switch in V position.

   c. Adjust the voltage output to at least 5 volts.

   d. Place the METER switch in I position.

   e. Set the CURRENT scale switch to x1.0 (0 to 2 amps full scale).

   f. Turn both the coarse and fine CURRENT controls fully clockwise.

   g. Short the output jacks by depressing the PRESS-TO-SET CURRENT switch, or by using an external jumper.

   h. Monitor the current meter and adjust R125 until a reading of 2 amps is obtained.

4. Maximum current limit for B supply

   a. Follow the same procedure used for the A supply described above, except use the B supply controls, and adjust R225.

5. Tracking Balance

   a. Turn the MODE select to position 4 (A and B supplies dual tracking).

   b. Place both the A and B METER switches in the V position.

   c. Monitor the A meter and adjust the volts control to obtain a convenient reading, between 20 and 25 volts.

   d. Monitor the B meter and adjust R234 to obtain a reading which is identical to the A meter.

   e. If very accurate balancing is desired, the output supply voltages may be monitored by using a DMM instead of the front panel meters.

SECTION VI
PARTS LIST
POWER SUPPLY
MODEL 5057A

When ordering parts be sure to give the reference designation, description, and the Hickok part number as listed in the following table. Also include the model and serial number of the equipment. There is a minimum billing charge of $5.00 for all parts orders.

REF DESIG.	NOTES	DESCRIPTION	HICKOK PART NO.
AR101		INTEGRATED CIRCUIT: LM741CN	9800-57
AR102		Same as AR101	
AR103		Same as AR101	
AR201		Same as AR101	
AR202		Same as AR101	
AR203		Same as AR101	
C101		CAPACITOR, FIXED, ELECTROLYTIC: 470 μF, -10% +50%, 25 volts	3085-451
C102		CAPACITOR, FIXED, ELECTROLYTIC: 1000 μF, -10% +50%, 25 volts	3085-452
C103		CAPACITOR, FIXED, ELECTROLYTIC: 330 μF, -10% +50%, 63 volts	3085-455
C104		CAPACITOR, FIXED, ELECTROLYTIC: 5500 μF, 60 volts	3085-499
C105		Same as C103	
C106		CAPACITOR, FIXED, DIPPED MICA: 220 pF, 5%, 500 volts	3096-533
C107		Same as C106	
C108		CAPACITOR, FIXED, ELECTROLYTIC: 47 μF, -10% +50%, 63 volts	3085-454
C201		Same as C101	
C202		Same as C102	
C203		Same as C103	
C204		Same as C104	
C205		Same as C103	
C206		Same as C106	
C207		Same as C106	
C208		Same as C108	

REF DESIG.	NOTES	DESCRIPTION	HICKOK PART NO.
CR101		RECTIFIER: diode bridge	18150-81
CR102		SEMICONDUCTOR DEVICE: bridge rectifier, 10 amps, type VJ248	3870-340
CR103		SEMICONDUCTOR DEVICE: 1N2069, .75 amp, 200 piv	3870-62
CR104		SEMICONDUCTOR DEVICE: 1N5731B, 6.2V, 400 MW ±5%	3870-302
CR105		Same as CR104	
CR106		Same as CR103	
CR107		SEMICONDUCTOR DEVICE: 1N914	3870-175
CR108		SEMICONDUCTOR DEVICE: zener diode, 1N5746B, 27 volts	3870-342
CR109		Same as CR107	
CR110		Same as CR107	
CR111		SEMICONDUCTOR DEVICE: 1N5729B, 5.1V, 400 MW ±5%	3870-320
CR112		Same as CR107	
CR113		Same as CR107	
CR114		Same as CR107	
CR115		Same as CR107	
CR116		Same as CR104	
CR117		SEMICONDUCTOR DEVICE: 1N5749B, 36 volts	3870-318
CR118		SEMICONDUCTOR DEVICE: 1N4139, 3 amps, 50 piv	3870-324
CR119		Same as CR103	
CR120		Same as CR103	
CR121		Same as CR107	
CR201		Same as CR101	
CR202		Same as CR102	
CR203		Same as CR103	
CR204		Same as CR104	
CR205		Same as CR104	
CR206		Same as CR103	
CR207		Same as CR107	
CR208		Same as CR108	
CR209		Same as CR107	
CR210		Same as CR107	
CR211		Same as CR111	

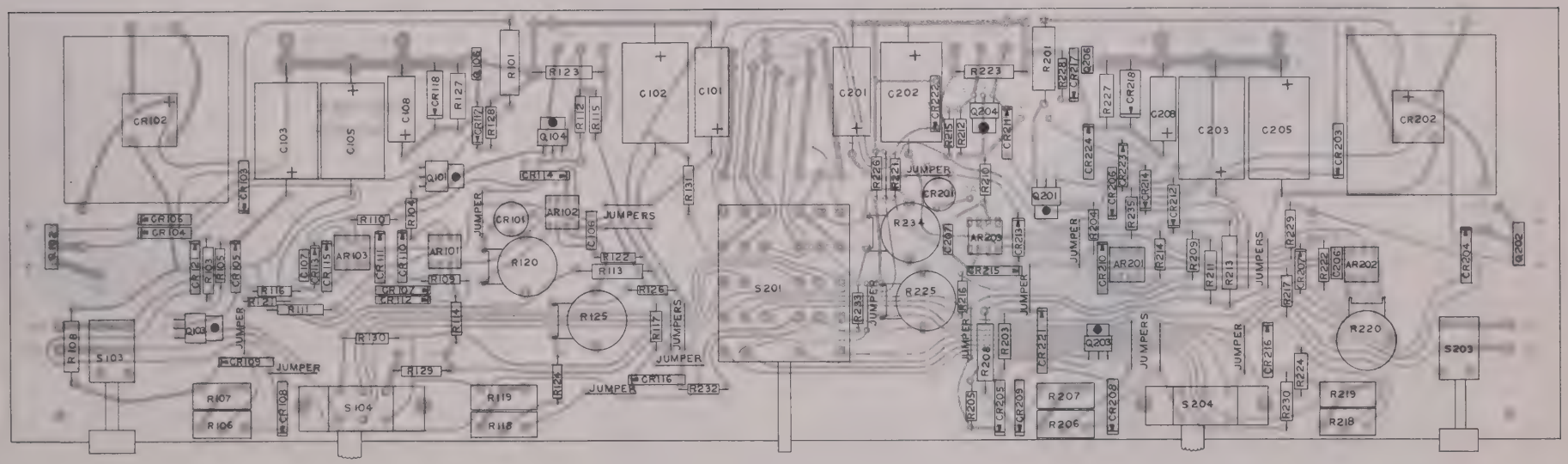
REF DESIG.	NOTES	DESCRIPTION	HICKOK PART NO.
CR212		Same as CR107	
CR213		Same as CR107	
CR214		Same as CR107	
CR215		Same as CR107	
CR216		Same as CR104	
CR217		Same as CR117	
CR218		Same as CR118	
CR219		Same as CR103	
CR220		Same as CR103	
CR221		Same as CR107	
CR222		Same as CR107	
CR223		Same as CR107	
CR224		Same as CR107	
DS101		LAMP: LED, type LSL-3L	12270-129
DS102		LAMP: pilot, clear red, with resistor	12270-60
DS201		Same as DS101	
F101		FUSE: 2 amp, SLO-BLO, holder type	6900-89
F201		Same as F101	
J101		BINDING POST: red	2360-68
J102		BINDING POST: black	2360-121
J103		BINDING POST: green	2360-123
J201		Same as J101	
J202		Same as J102	
J203		Same as J103	

REF DESIG.	NOTES	DESCRIPTION	HICKOK PART NO.
M101		METER: dual voltage scale	13450-14
M201		METER: dual current scale	13450-17
P101		CORD: line	3675-49
Q101		TRANSISTOR: NSD104, NPN, medium power	20861-387
Q102		TRANSISTOR: 2N4442 silicon controlled rectifier	20861-367
Q103		TRANSISTOR: MPS-U55, PNP	20861-327
Q104		Same as Q101	
Q105		TRANSISTOR: 2N3055	20861-368
Q106		TRANSISTOR: triac, type 40669	20861-299
Q201		Same as Q101	
Q202		Same as Q102	
Q203		Same as Q103	
Q204		Same as Q101	
Q205		Same as Q105	
Q206		Same as Q106	
R101		RESISTOR, FIXED, COMPOSITION: 330 ohms, 10%, 2 watt	18431-332
R102		RESISTOR, FIXED, WIRE WOUND: 1 ohm, 5%, 50 watt	18575-659
R103		RESISTOR, FIXED, COMPOSITION: 4.7k ohms, 10%, 1/2 watt	18412-472
R104		RESISTOR, FIXED, DEPOSITED CARBON: 3k ohms, 5%, 1/4 watt	18470-302
R105		RESISTOR, FIXED, DEPOSITED CARBON: 470 ohms, 5%, 1/4 watt	18470-471
R106 and R107		RESISTOR, VARIABLE: dual concentric, 10k ohms front section, 1k ohms rear section, 30%, 1/2 watt	16925-826
R108		RESISTOR, FIXED, COMPOSITION: 4.7k ohms, 10%, 1 watt	18422-472
R109		RESISTOR, FIXED, DEPOSITED CARBON: 100k ohms, 5%, 1/4 watt	18470-104
R110		RESISTOR, FIXED, DEPOSITED CARBON: 2.2k ohms, 5%, 1/4 watt	18470-222
R111		RESISTOR, FIXED, COMPOSITION: 47k ohms, 10%, 1/2 watt	18413-472
R112		RESISTOR, FIXED, DEPOSITED CARBON: 1k ohms, 5%, 1/4 watt	18470-102

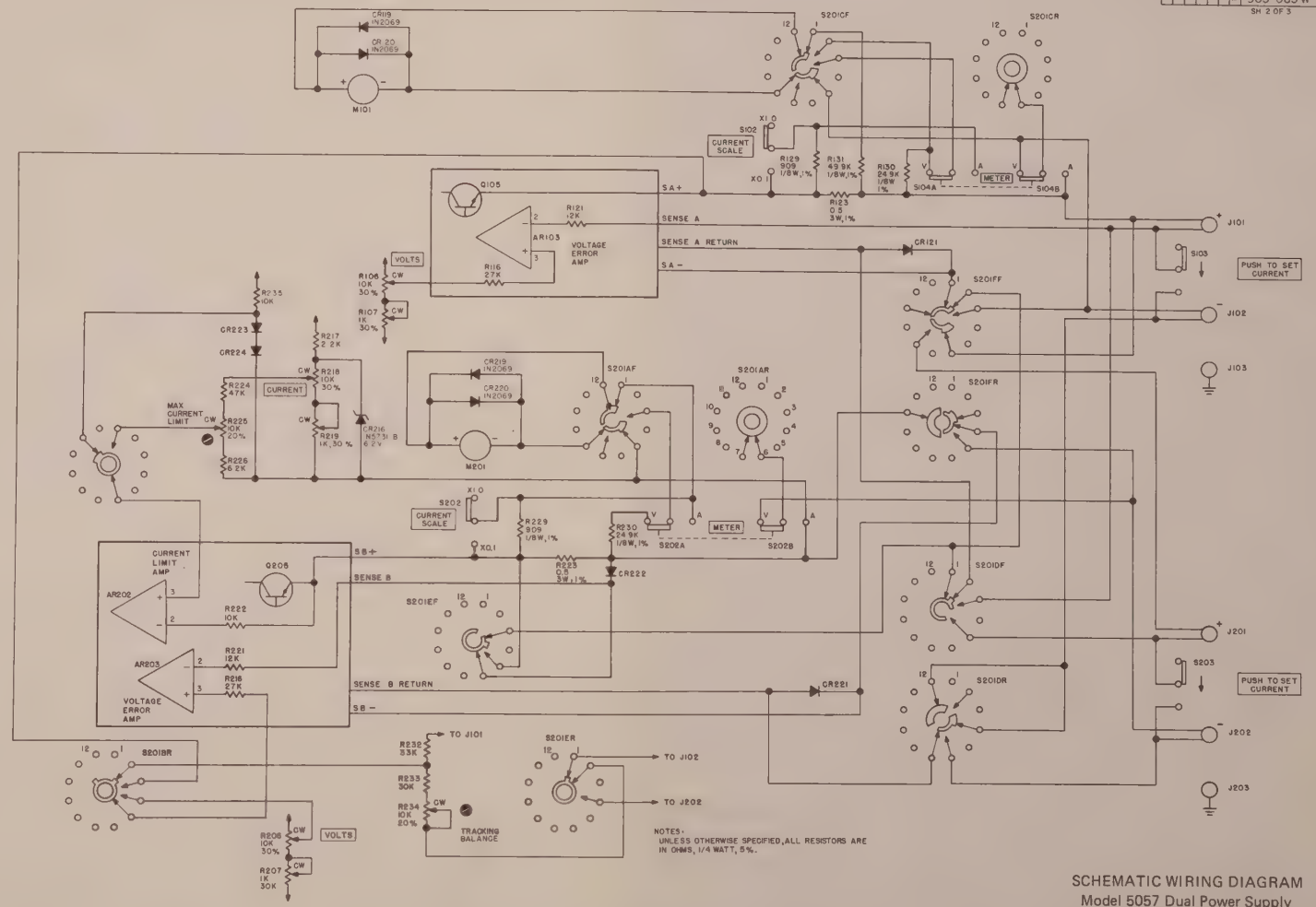
REF DESIG.	NOTES	DESCRIPTION	HICKOK PART NO.
R113		RESISTOR, FIXED, COMPOSITION: 10k ohms, 10%, 1 watt	18423-102
R114		RESISTOR, FIXED, DEPOSITED CARBON: 10k ohms, 5%, 1/4 watt	18470-103
R115		Same as R112	
R116		RESISTOR, FIXED, DEPOSITED CARBON: 27k ohms, 5%, 1/4 watt	18470-273
R117		Same as R110	
R118 and R119		Same as R106 and R107	
R120		RESISTOR, VARIABLE: 10k ohms, 20%, horizontal mtg	16925-615
R121		RESISTOR, FIXED, DEPOSITED CARBON: 12k ohms, 5%, 1/4 watt	18470-123
R122		Same as R114	
R123		RESISTOR, FIXED, WIRE WOUND: .5 ohms, 1%, 3 watt	18575-644
R124		RESISTOR, FIXED, DEPOSITED CARBON: 47k ohms, 5%, 1/4 watt	18470-473
R125		Same as R120	
R126		RESISTOR, FIXED, DEPOSITED CARBON: 6.2k ohms, 5%, 1/4 watt	18470-622
R127		RESISTOR, FIXED, COMPOSITION: 10k ohms, 10%, 1/2 watt	18413-102
R128		RESISTOR, FIXED, DEPOSITED CARBON: 100 ohms, 5%, 1/4 watt	18470-101
R129		RESISTOR, FIXED, METAL FILM: 909 ohms, 1%, 1/8 watt	18554-181
R130		RESISTOR, FIXED, METAL FILM: 24.9k ohms, 1%, 1/8 watt	18554-183
R131		RESISTOR, FIXED, METAL FILM: 49.9k ohms, 1%, 1/8 watt	18554-182
R201		Same as R101	
R202		Same as R102	
R203		Same as R103	
R204		Same as R104	
R205		Same as R105	
R206 and R207		Same as R106 and R107	
R208		Same as R108	
R209		Same as R109	
R210		Same as R110	
R211		Same as R111	

REF DESIG.	NOTES	DESCRIPTION	HICKOK PART NO.
R212		Same as R112	
R213		Same as R113	
R214		Same as R114	
R215		Same as R112	
R216		Same as R116	
R217		Same as R110	
R218 and R219		Same as R106 and R107	
R220		Same as R120	
R221		Same as R121	
R222		Same as R114	
R223		Same as R123	
R224		Same as R124	
R225		Same as R120	
R226		Same as R126	
R227		Same as R127	
R228		Same as R128	
R229		Same as R129	
R230		Same as R130	
R231		Not used	
R232		RESISTOR, FIXED, DEPOSITED CARBON: 33k ohms, 5%, 1/4 watt	18470-333
R233		RESISTOR, FIXED, DEPOSITED CARBON: 30k ohms, 5%, 1/4 watt	18470-303
R234		Same as R120	
R235		Same as R114	
S101		SWITCH: slide, spst, 11/32" black knob	19911-152

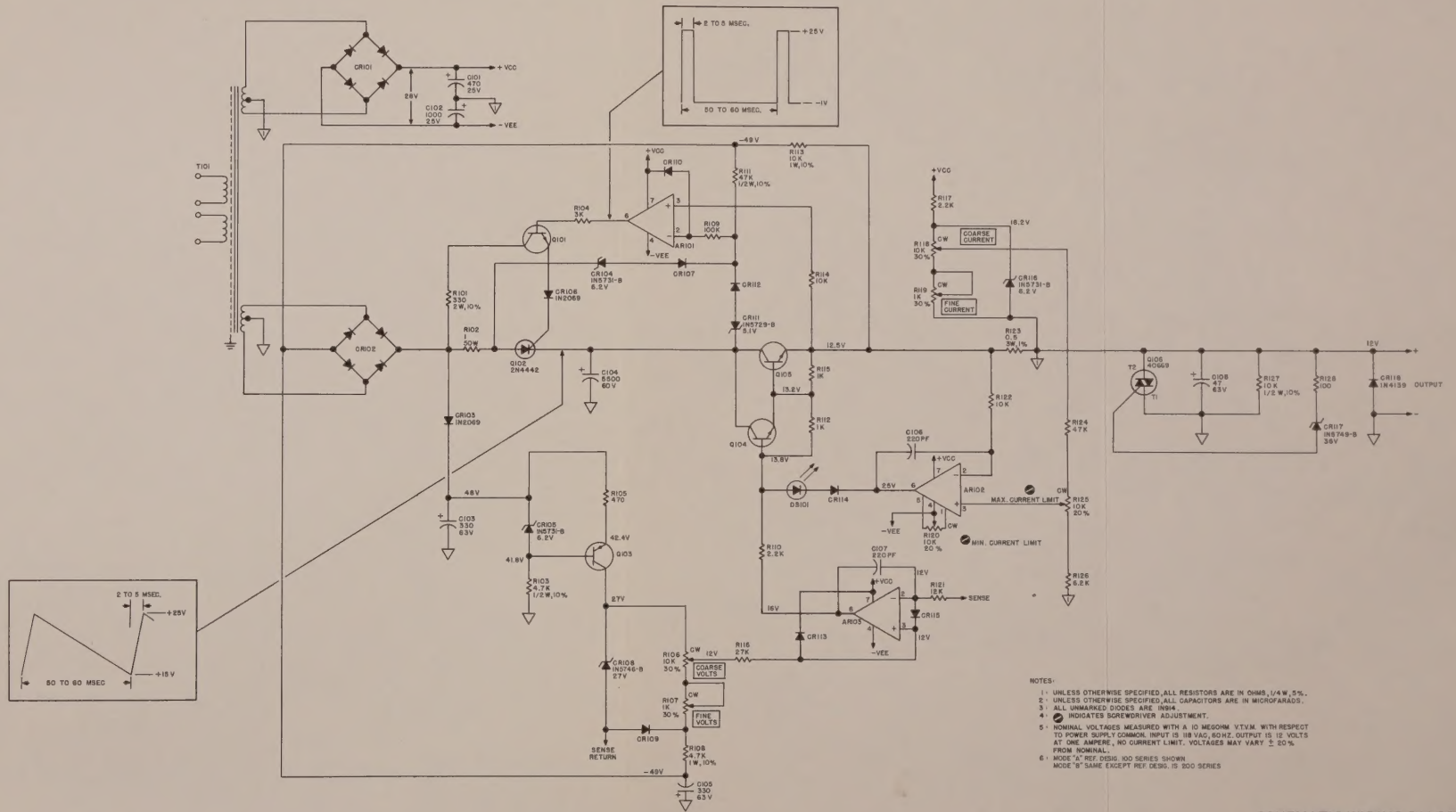
REF DESIG.	NOTES	DESCRIPTION	HICKOK PART NO.
S102		Same as S101	
S103		SWITCH: momentary pushbutton, single station, dpdt	19910-242
S104		SWITCH: slide, dpdt, 1/2" black knob	19911-153
S201		SWITCH: rotary, 6 section, 4 position, mode selection	19912-699
S202		Same as S101	
S203		Same as S103	
S204		Same as S104	
T101		TRANSFORMER: power, 25 volt supply	20800-427
T201		Same as T101	



MODEL 5057
Main P. C. Board

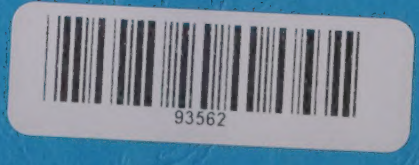


SCHEMATIC WIRING DIAGRAM
Model 5057 Dual Power Supply
(Interconnection - A and B)



NOTES:
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTORS ARE IN OHMS, 1/4 W, 5%.
2. UNLESS OTHERWISE SPECIFIED, ALL CAPACITORS ARE IN MICROFARADS.
3. ALL UNMARKED DIODES ARE IN914.
4. ⊘ INDICATES SCREWDRIVER ADJUSTMENT.
5. NOMINAL VOLTAGES MEASURED WITH A 10 MEGOHM V.T.V.M. WITH RESPECT TO POWER SUPPLY COMMON. INPUT IS 118 VAC, 60HZ. OUTPUT IS 12 VOLTS AT ONE AMPERE, NO CURRENT LIMIT. VOLTAGES MAY VARY ± 20% FROM NOMINAL.
6. MODEL "A" REF. DESIG. 100 SERIES SHOWN
MODEL "B" SAME EXCEPT REF. DESIG. IS 200 SERIES

SCHEMATIC WIRING DIAGRAM
Model 5057 Dual Power Supply
(Section-A only)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